

encoding the sequence of images as video having video frames, each video frame tagged with viewing angle information of the corresponding image; and  
~~viewing the object in 3-D by random access of the video~~ visualizing the object by displaying the frame substantially corresponding to the user's desired view angle.

2. (currently amended) ~~The method of claim 1, wherein step of capturing is performed by~~ A method of visualizing a desired view of an object by a user using a computer, comprising the steps of:

capturing images of the object as a sequence of images according to an image capturing sequence;

encoding the sequence of images as video having video frames, each video frame tagged with viewing angle information of the corresponding image; and  
visualizing the object by displaying the frame substantially corresponding to the user's desired view angle.

wherein the step of capturing is performed by taking samples of the taking samples of the images of the object from a viewing angle of an azimuth angle  $\theta$  and an elevation angle  $\phi$  in the spherical coordinates.

3. (original) The method of claim 2, wherein the video frames are tagged with  $\theta$  and  $\phi$ .

4. (original) The method of claim 2, wherein the step of taking samples uses a slicing sampling technique where a series of samples are taken with  $\theta$  updated in constant steps and with  $\phi$  fixed before another series of samples are taken with the updated  $\phi$ .

5. (original) The method of claim 2, wherein the step of taking samples uses an anisotropic spiral sampling technique, where a series of samples are taken with  $\theta$

and  $\phi$  changed in constant steps.

6. (original) The method of claim 2, wherein the step of taking samples uses an isotropic spiral sampling technique, where a series of samples are with  $\theta$  and  $\phi$  changed so that the distance between two adjacent samples is substantially equal.

7. (currently amended) The method of claim 12, wherein the video is streamed so that the ~~viewing~~visualization can start as soon as one or more frames have been received.

8. (currently amended) The method of claim 12, wherein the step of encoding includes the step of compressing the video.

9. (original) The method of claim 8, wherein the step of compressing uses MPEG.

10. (original) The method of claim 8, wherein the step of compressing uses H.261.

11. (original) The method of claim 8, wherein the step of compressing uses H.263.

12. (original) The method of claim 8, wherein the step of compressing uses H.263+.

13. (currently amended) The method of claim 1, wherein the step of ~~viewing~~visualization includes the step of pre-decoding the video for real-time display.

14. (currently amended) The method of claim 12, wherein ~~the video is compressed using MPEG and the step of viewing the object includes the step of streaming I-frames followed by P-frames followed by B-frames~~ the step of visualization includes the step of pre-decoding the video for real-time display.

15. (currently amended) The method of claim 12, wherein the step of ~~viewing~~visualizing the object includes the step of streaming the most important frames first.

16. (currently amended) The method of claim 12, further including the step of editing the captured images before encoding.

17. (currently amended) The method of claim 12, further comprising the step of

manipulating the viewing angle of the object while ~~viewing~~ visualizing the object.

18. (original) The method of claim 17, wherein the step of manipulating includes the step of rotating the object.

19. (original) The method of claim 17, wherein the step of manipulating includes the step of zooming the object.

20. (original) The method of claim 17, wherein the step of manipulating includes the step of manipulating the object in the NEWS (north-east-west-south) mode, where the object is rotated along the east-west direction or along the north-south direction.

21. (original) The method of claim 17, wherein the step of manipulating includes the step of manipulating the object in the AVIATION mode, where the object is rotated along the direction of the two orthogonal great circle of a sphere having the object at the center.

22. (currently amended) The method of claim 12, further comprising the step of storing the image sequence in a database.

23. (original) The method of claim 22, wherein the database is a centralized database.

24. (original) The method of claim 22, wherein the database is a distributed database.

25. (original) The method of claim 22, wherein the database is accessed through a network.

26. (original) The method of claim 25, wherein the network is the Internet.

27. (original) The method of claim 26, further comprising the step of publishing the URL corresponding to the location of the image sequence within the database.

28. (original) The method of claim 27, wherein the URL is password protected.

29. (currently amended) The method of claim 42, wherein the step of ~~viewing~~  
~~including visualization~~ includes the step of downloading a separate multimedia  
stream.
30. (currently amended) The method of claim 29, wherein the separate multimedia  
~~stream~~stream includes zoom data requested by the user.
31. (currently amended) The method of claim ~~26~~29, wherein the separate multimedia  
stream includes other related data requested by the user.
32. (original) The method of claim 31, wherein the related data is video.
33. (original) The method of claim 31, wherein the related data is still images.
34. (original) The method of claim 31, wherein the related data is sound.
35. (original) The method of claim 31, wherein the related data is coordinates of  
points on the object.
36. (currently amended) A system of visualizing ~~a real 3-D object~~ a desired view of  
an object by a user using a computer, comprising the steps of:
- an image capture device for capturing images of the object as a sequence of  
images;
  - an encoder for encoding the sequence of images as video having video  
frames, each video frame tagged with viewing angle information of the  
corresponding image; and
  - ~~a viewer for viewing the object in 3-D~~  
a visualizer for visualizing the object in 3-D by displaying the frame  
substantially corresponding to the user's desired view angle.
37. (original) The system of claim 36, wherein the image capture device includes  
a camera.
38. (currently amended) ~~The system of claim 36,~~ A system of visualizing a desired

view of an object by a user using a computer, comprising the steps of:

an image capture device for capturing images of the object as a sequence of images;

an encoder for encoding the sequence of images as video having video frames, each video frame tagged with viewing angle information of the corresponding image; and

a visualizer for visualizing the object in 3-D by displaying the frame substantially corresponding to the user's desired view angle,

wherein the image capture device has means for taking samples of the images of the object from a viewing angle of an azimuth angle  $\theta$  in the horizontal plane and an elevation angle  $\phi$  from the horizontal plane.

39. (original) The system of claim 38, wherein the video frames are tagged with  $\theta$  and  $\phi$ .

40. (currently amended) The system of claim 3638, wherein the video is streamed so that the visualization can start as soon as one or more frames have been received.

41. (currently amended) The system of claim 3638, wherein the encoder includes a video compressor for compressing the video.

42. (original) The system of claim 41, wherein the video compressor is an MPEG encoder.

43. (original) The system of claim 41, wherein the video compressor is an H.261 encoder.

44. (original) The system of claim 41, wherein the video compressor is an H.263 encoder.

45. (currently amended) The system of claim 3836, wherein the viewer-visualizer includes a look-up-table (LUT) for mapping the view angle to a frame number.

46. (currently amended) The system of claim 38, wherein the ~~viewer~~ visualizer includes a pre-decoder for pre-decoding the video for fast retrieval.
47. (currently amended) The system of claim ~~36~~38, further including an editor for editing the captured images after encoding.
48. (currently amended) The system of claim ~~37~~38, wherein the visualizer includes means for manipulating the object while visualizing.
49. (original) The system of claim 37, further comprising a database for the image sequence in a database.
50. (original) The system of claim 49, wherein the database is a centralized database.
51. (original) The system of claim 49, wherein the database is a distributed database.
52. (original) The system of claim 49, further comprising a network for access the database.
53. (original) The system of claim 52, wherein the network is the Internet.
54. (currently amended) A program product for enabling a user for viewing and manipulating a real 3-D object to visualize a desired view of an object by a user, which can run at a computer to perform the steps of:
- capturing images of the object as a sequence of images according to a particular capturing sequence;
  - encoding the sequence of images as video having video frames, each frame tagged with viewing information of the corresponding image;
  - storing the video in a database;
  - ~~viewing the object in 3-D through random access of the video; and~~
  - ~~manipulating the object in 3-D;~~

and visualizing the object by displaying the frame substantially corresponding to the user's desired view angle.

55. (original) The program product of claim 54, wherein the video is encoded using MPEG1

56. (original) The program product of claim 54 wherein the database is accessed through the Internet.

57. (currently amended) A method for enabling a user to visualize ~~and manipulate a real 3-D object~~ a desired view of an object, comprising the steps of:

capturing images of the object as a sequence of images according to a particular image capturing sequence;

encoding the sequence of images as video having video frames, each frame tagged with viewing information of the corresponding image;

storing the video in a database; and

sending the video at the request of the user over a network.

58. (original) The method of claim 57, wherein the video is encoded using MPEG1

59. (original) The method of claim 57, wherein the network is the Internet.

60. (currently amended) The method of claim 57, further comprising the steps of:

receiving the video by a user;

~~viewing the object in 3-D through random access of the received video; and manipulating the object in 3-D.~~

and visualizing the object by displaying the frame substantially corresponding to the user's desired view angle.

61. (original) A method of visualizing 3-D volume data of an object, comprising the steps of:

capturing the 3D volume data as a stack of 2D tomographic images of the

object;

obtaining a sequence of projected 2D images by projecting the 3D volume data at prescribed azimuth and elevation angles;

encoding the sequence of projected 2D images wherein each images are tagged with azimuth and elevation angles;

storing the sequence of 2D images; and

viewing the object in 3-D by random access of stored 2D image sequence.

62. (original) The method of claim 61 wherein the step of capturing the 3D volume data uses positron emission tomography (PET).

63. (original) The method of claim 61, wherein the step of capturing the 3D volume data uses single positron emission computed tomography (SPECT).

64. (original) The method of claim 61, wherein the step of capturing the 3D volume data uses X-ray computed tomography (CT).

65. (original) The method of claim 61, wherein the step of capturing the 3D volume data uses ultrasound imaging.

66. (original) The method of claim 61, wherein the step of capturing the 3D volume data uses magnetic resonance imaging (MRI),

67. (original) The method of claim 61 wherein the step of encoding includes video encoding using MPEG.

68. (original) The method of claim 61, wherein the object includes human bodies.

69. (original) The method of claim 61, wherein the object includes biological tissues.

70. (original) The method of claim 61, wherein the object includes organic materials.

71. (original) The method of claim 61, wherein the object includes inorganic



materials.

72. (original) The method of claim 61, further comprising the step of manipulating the object.

73. (original) The method of claim 72, wherein the step of manipulating includes the step of rotating the object.

74. (original) A method of visualizing 3-D volume data of an object, comprising the steps of:

obtaining a sequence of 2D images at prescribed azimuth and elevation angles rendered by a CAD program;

encoding the sequence of 2D images where each images are tagged with azimuth and elevation angles;

storing the sequence of 2D images; and  
viewing the object in 3-D by random access of stored 2D image sequence.

75. (original) The method of claim 74, wherein the step of encoding includes video encoding using MPEG.

76. (original) The method of claim 74, further including the step of manipulating the object.

77. (original) The method of claim 76, wherein the step of manipulating includes the step of rotating the object.

78. (original) A method of providing a customer with a one-stop service for 3-D visualization of a real object over the Internet, comprising the steps of:

receiving the object from the customer;

capturing images of the object as a sequence of images each images tagged with an azimuth angle  $\theta$  and an elevation angle  $\phi$  in the spherical coordinates; and  
storing the image sequence in a database for transmission over the Internet at the